Massachusetts Department of ENVIRONMENTAL PROTECTION

2002 ENVIRONMENTAL MONITORING OVERVIEW

Water quality monitoring, assessment and management in Massachusetts are sequentially performed in accordance with a rotating five-year watershed schedule. Surface waters in each watershed are sampled during Year 2 of the cycle. The Environmental Monitoring Program of the Division of Watershed Management (DWM) Watershed Planning Section performed year 2002 monitoring activities primarily within the Charles, Housatonic, Hudson, and Ten Mile watersheds and the North Coastal drainage area. Initial meetings were held with the appropriate EOEA and DEP watershed team leaders to describe the water monitoring and assessment process, and to review specific monitoring needs within the respective watersheds. DWM personnel then formulated individual watershed monitoring plans that were subsequently incorporated into a single comprehensive *Quality Assurance Project Plan (QAPP) for 2002 Watershed Monitoring*. This plan was prepared to ensure effective and efficient sampling design and to ensure that all data gathered meet specific data quality objectives (e.g., the data are representative of field conditions; are as accurate and precise as possible given available monitoring resources). In addition, existing and newly revised programmatic QAPPs were used for selected DWM monitoring functional elements such as the fish contaminant monitoring program, benthic macroinvertebrate studies, and for monitoring in support of the development of lake TMDLs. Finally, a series of field QA/QC audits were carried out to evaluate the performance of monitoring crews and to ensure that sampling was carried out in accordance with the specifications of the QAPP and the DWM's standard operating procedures (SOP).

While some of the DWM monitoring activities in 2002 were focused directly on specific issues in the respective "Year Two" watersheds, other monitoring in those watersheds was aimed at providing the necessary information to determine the extent to which water bodies are supporting their intended uses, as defined by the Massachusetts Surface Water Quality Standards. This information will be used in the preparation of individual watershed assessment reports, the Massachusetts Integrated List of Waters submitted to the EPA in fulfillment of sections 305b (Summary of Water Quality) and 303d (List of Impaired Waters) of the Clean Water Act (CWA), and will provide, in part, "the percent of waters that are safe for fishing, and support aquatic life and recreation", and other BRP "environmental indicators" identified in the State-EPA Performance Partnership Agreement (PPA).

Efforts to gather data in support of the Massachusetts TMDL program continued in 2002. As in the previous three years, a decision was made to continue to survey 303(d)-listed lakes and ponds to provide information for the development of TMDLs for those water bodies. Twenty lakes were chosen for study, and all of them were situated within the "Year 2" watersheds scheduled for monitoring by the DWM.

Finally, the DWM took initial steps toward developing in-house capabilities for the "clean" field collection of ambient water samples for trace levels of total recoverable and dissolved metals. QAPP and SOP documents were prepared that describe the necessary survey preparation and

field procedures for the collection of uncontaminated aqueous trace metals samples from rivers and streams. In addition, some preliminary field investigations were performed to evaluate the feasibility of implementing those procedures. A final technical memorandum was produced.

A brief monitoring summary for each watershed is presented below, revised as needed from the QAPP based on what actually occurred.

CHARLES

1) **Water quality:**

Water quality sampling was performed in the Charles watershed to provide data for 305(b) assessment and to document known or suspected water quality problems. Water quality surveys were conducted during the weeks of April 29-May 3, June 3-7, July 8-12, August 5-9 and September 9-13. Samples for TSS and nutrient analyses were obtained from a total of twenty (20) stations. Dissolved oxygen and other field parameters were measured at twenty-two (22) sites. Samples for bacterial analysis (fecal coliform and E.coli) were obtained from nineteen (19) sites. Four (4) sites were screened for the presence of optical brightening agents.

River/Stream	Monitoring Site Description (sample type*)
Charles River	Dnstr. from Wildcat Pond, Milford (1,2,3)
Charles River	Upstr. from Maple Street, Bellingham (1,2)
Beaver Brook	At Municipal Well # 5, Bellingham (4)
Beaver Brook	Upstr. from trail, adjacent to Taunton Street, Bellingham (1,2,3,4)
Charles River	Upstr. from Walker Street (above CRPCD facility), Medway (1,2,3)
Mine Brook	Upstr. from Pond Street, Franklin (1)
Chicken Brook	Upstr. from Prentice Street, Holliston (4)
Chicken Brook	Upstr. from Washington Street, Holliston (1,2,3,4)
Charles River	Dnstr. from Dean Street (below CRPCD facility), Millis (1,2)
Charles River	Upstr. from Rte. 27 (below Medfield POTW), Medfield (1,2)
Charles River	Upstr. from confluence with Davis Brook, off Rte. 16, Natick (1,2,3)
Stop River	Dnstr. from Lincoln Street, Norfolk (1,2,3)
Stop River	Dnstr. from Noon Hill Road, Medfield (1,2,3)
Bogastow Brook	Dnstr. from Orchard Street, Millis (1,2)
Charles River	Upstr. from USGS gage at end of Mill Street, Dover (1,2)
Fuller Brook	Upstr. from Dover Road, Wellesley (1,3)
Powissett Brook	Dnstr. from Wilsondale Road, Dover (3)
Charles River	Upstr. from Washington Street/Hunnewell Bridge, Wellesley (1,2)
Rock Meadow Brook	Upstr. from Dedham Country Club impoundments, Westwood (1,2,3)
Saw Mill Brook	Upstr. from Baker Street (below storm drain no. BWSC 124), Newton (1,2,3)
Saw Mill Brook	Upstr. from Baker Street (above storm drain no. BWSC 124), Newton (3)
South Meadow Brook	Dnstr. from Needham Street (below storm drain), Newton (1,2,3)
Rosemary Brook	Upstr., from Barton Street, Wellesley (1,2,3)
Stony Brook	Off Sibley Road, Weston/Waltham (1,2,3)
Beaver Brook	Upstr. from Beaver Street, Waltham (3)
Beaver Brook	Upstr. from Mill Pond, Waltham (1,2,3)
Cheese Cake Brook	Near mouth off Albemarle Road, Newton (1,2,3)
Cheese Cake Brook	Upstr. from Watertown Street (above storm drain), Newton (3)

*1-Hydrolab, 2-TSS/nutrient, 3-bacteria samples, 4-optical brighteners

2) **TMDL Lakes:**

Seven (7) lakes and ponds were surveyed to provide data in support of the DWM TMDL program. These lakes and ponds are listed on the 1998 303(d) List of Impaired Waters and are candidates for TMDL development. Working with EPA, a plan was developed to gather sufficient data from each lake to support the TMDL work. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, secchi disc readings, in situ water quality profile measurements (i.e. temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis at WES, chlorophyll a determinations and the analysis of apparent color. Each of the following lakes was sampled on three separate occasions, although Hydrolab profiles were obtained only once.

NAME	***MUNICIPALITY***
Chandler Pond	Boston
Hammond Pond	Newton
Jamaica Pond	Boston
Mirror Lake	Wrentham/Norfolk
Lake Pearl	Wrentham
Uncas Pond	Franklin
Weld Pond	Dedham

3) **Biological monitoring:** Biological monitoring in the Charles watershed entailed macroinvertebrate, fish and periphyton community assessments and fish toxics monitoring. The following is a brief description of these monitoring elements.

A. Macroinvertebrate, Fish and Periphyton Community Assessments:

Benthic macroinvertebrate, fish population monitoring and periphyton community assessments were performed according to the table below. Habitat assessments were also performed at most of these sites. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate and fish sampling procedure utilized Rapid Biomonitoring Protocols (RBPs). Periphyton assessments were performed at twelve sites where macroinvertebrate sampling was conducted. This consisted of an approximation of the algal coverage within the reach, and scrapes of various substrates within the riffle zone to obtain samples for taxonomic identification to genus. An estimate was also made of dominance within the sample. In addition, estimates of periphyton biomass were made at eight (8) sites by deploying artificial substrates and determining the chlorophyll-a concentration as well as the ash-free dry weight of the periphyton samples.

Charles
Biomonitoring Site Description (sample type*)
Charles River dnstr. from Maple Street, Bellingham (2)
Beaver Brook near Nason Street, Bellingham (2)

Hopping Brook near West Street, Medway, MA (1,2,3A,3B)
Chicken Brook dnstr. from Milk Pond, Winthrop St., Medway, MA (1,3A)
Chicken Brook upstr. from confluence with Charles River, Medway (2)
Charles River near Walker Street, Medway, MA (1,3A,3B)
Charles River dnstr. from Dean Street, Millis, MA (1,3A,3B)
Mine Brook dnstr. from Rte. 140, Franklin, MA (1,2,3A)
Stop River dnstr. from Pine Street, Norfolk, MA (1,3A,3B)
Stop River near Noon Hill Street, Medfield, MA (1,2,3A,3B)
Charles River dnstr. from Watertown Dam, Watertown, MA (1,3A,3B)
Stony Brook dnstr. from Church Street, Weston, MA (1,2)
Fuller Brook upstr. from Cameron Street, Wellesley, MA (1,2,3A)
Charles River at Dover USGS gage, Dover, MA (1,3A,3B)
Trout Brook near Haven Street, Dover, MA (1,2,3B)
Powisett Brook dnstr. from Wilsondale Road, Dover, MA (1)
Mill River dnstr. from Main Street, Norfolk, MA (1,3A)
Rock Meadow Brook upstr. from Summer Street, Westwood, MA (1)
Saw Mill Brook upstr. from Baker Street (below storm drain), Newton (3A)

*1-Macroinvertebrate, 2-Fish population, 3A-Periphyton id's, 3B-Periphyton biomass

B. Fish Toxics Monitoring:

Fish toxics monitoring was performed at two locations. Fish collections were made on May 16, 2002 at Lake Pearl (Wrentham) and from October 8-10, 2002 at Box Pond (Bellingham). Edible fillets were analyzed for the presence of heavy metals, PCB, and organochlorine pesticides. Freshwater fish consumption advisories will be issued by DPH if warranted.

HOUSATONIC

1) **Water quality:**

Water quality sampling was performed in the Housatonic watershed to provide data for 305(b) assessment and to document known or suspected water quality problems. Water quality surveys were conducted during the weeks of May 20-24, June 24-28, July 29-August 2, September 2-6 and September 23-27. Dissolved oxygen and other field parameters were measured at a total of eighteen (18) sites. Samples for TSS and nutrient analyses were obtained from a total of thirteen (13) stations. Samples for bacterial analysis (fecal coliform and E. coli) were obtained from eighteen (18) sites. In order to meet sample holding times TSS, nutrient and bacterial analyses were performed through a contractual arrangement with Berkshire Environmental Labs of Lee, MA. Three (3) sites were screened for the presence of optical brightening agents. Water samples for chlorophyll-a analyses were collected from nine (9) sites and continuous temperature monitoring was performed at four (4) sites.

River/Stream	Monitoring Site Description (sample type*)
East Branch Housatonic River	Hubbard Avenue, Dalton (1,2,3)
East Branch Housatonic River	Pomeroy Avenue, Pittsfield (1,3)
Housatonic River	Fairfield Street, Pittsfield (1,3)
Housatonic River	Holmes Road, Pittsfield (1,3,5)
Housatonic River	New Lenox Road, Lenox (1,3,5)
Williams River	Division Street, Van Deusenville (1,2,3)
Goose Pond Brook	Forest Street, Lee (1,2,3,4)
Goose Pond Brook	Tyringham Road, Lee (3,4)
Windsor Brook	Old Windsor Road, Windsor (1)
Hubbard Brook	Miller Road, Sheffield (1,2,3,6)
Housatonic River	Valley Street, Lenox (1,2,3)
Housatonic River	Willow Creek Road, Lenox (5)
Housatonic River	Directly dnstrm from Lee WWTP, Rte 102, Lee (1,2,3,5)
Housatonic River	Behind Housatonic Valley Assn. Office, Route 102, Lee (6)
Housatonic River	Route 183, Stockbridge (1,2,3,5)
Housatonic River	Division Road, Great Barrington (1,2,3,5,6)
Housatonic River	Kellogg Road, Sheffield (1,2,3,5)
Green River	Maple Avenue, Great Barrington (1,2,3)
Konkapot River	Route 7A, Ashley Falls (1,2,3)
Greenwater Pond Brook	Forest Street, Lee (1,2,3,4)
Hop Brook	Meadow Street, Lee (1,2,3,5,6)

*1-Hydrolab, 2-TSS/nutrients, 3-bacteria samples, 4-optical brighteners, 5-chlorophyll-a analyses, 6-continuous temperature

2) **TMDL Lakes:**

Lake Buel (Monterey) was surveyed on three separate occasions to provide data in support of the DWM TMDL program. This lake is listed on the 1998 303(d) List of Impaired Waters and is a candidate for TMDL development. Working with EPA, a plan was developed to gather sufficient data to support the TMDL work. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, secchi disc readings, in situ water quality profile measurements on one occasion (i.e. temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis at WES, chlorophyll a determinations and the analysis of apparent color.

3) **Biological monitoring:** Biological monitoring in the Housatonic watershed entailed macroinvertebrate, periphyton and fish population assessments and fish toxics monitoring. The following is a brief description of these monitoring elements.

A. Macroinvertebrate and Periphyton Assessments:

Biomonitoring and habitat assessment to evaluate water quality and habitat quality was performed at a total of fifteen (15) sites. These are listed below. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure utilized Rapid Biomonitoring Protocols (RBP). The periphyton assessment consisted

of an approximation of the algal coverage within the reach, and scrapes of various substrates within the riffle zone to obtain samples for taxonomic identification to genus. An estimate was also made of dominance within the sample.

Housatonic
Biomonitoring Site Description (sample type*)
Green River dnstr. from Rte. 23/41, Great Barrington, MA (1,3)
Housatonic River off Rte. 183, Stockbridge, MA (1,3)
Konkapot River at Rte. 124, North Canaan, CT (1,3)
Konkapot River along Clayton Mill River Road, New Marlborough, MA (1,3)
Konkapot River upstr. from Mill River Road above Mill River, New Marlborough (2)
Williams River upstr. from Rte. 41, Great Barrington, MA (1,2,3)
Wahconah Falls Brook at Holiday Farms Road, Dalton, MA (1,3)
East Branch Housatonic River at Jericho Road, Hinsdale, MA (1,3)
Southwest Branch Housatonic River at Barker Rd., Pittsfield, MA (1)
Windsor Brook at Old Windsor Road, Windsor, MA (1,2,3)
West Branch Housatonic River dnstr. from Rte. 20, Pittsfield, MA (1)
East Branch Housatonic River upstr. from Hubbard Ave., Pittsfield, MA (1,2,3)
Housatonic River at Crescent Mills, Lenox, MA (1,3)
Goose Pond Brook dnstr. from Forest Street, Lee, MA (1,3)
Housatonic River at Tyringham Road/power lines, Lee, MA (1,3)
Konkapot River at Bidwell Park, Monterey, MA (1,3)
Cleveland Brook at Old Windsor Road, Hinsdale, MA (2)
Cady Brook at New Windsor Road, Hinsdale, MA (2)
Hop Brook at Main Road behind Fire Station, Tyringham, MA (2)

*1-Macroinvertebrate, 2-Fish population, 3-Periphyton id's

B. Fish Population Assessments:

Fish population and habitat assessments were conducted by the DWM at seven (7) sites denoted in the above table to provide a more comprehensive assessment of the aquatic life use status of waterbodies in the Housatonic watershed. Methods used to assess fish populations followed a modified version of the USEPA Rapid Bioassessment Protocol V (RBPV). The MDFW performed fish population assessments at an additional 34 locations in the Housatonic watershed. These are listed below.

Ashley Brook
Churchill Brook
Goose Pond Brook
Greenwater Brook
Housatonic River – East Branch
Housatonic River –Southwest Branch
Larrywaug Brook (two sites)
Mohawk Brook
Wahconah Brook (two sites)
Williams River (two sites)
Camp Brook
Furnace Brook
Green River (two sites)
Housatonic River (12 sites)
Housatonic River – West Branch
Konkapot River
Merry Brook
Tyler Brook
Welch Brook

C. Fish Toxics Monitoring:

Fish toxics monitoring was performed at two locations. Fish collections were made on June 20,

2002 at Pontoosuc Lake (Lanesborough/Pittsfield) and July 9, 2002 at Lake Buel (Monterey). Edible fillets were analyzed for the presence of heavy metals, PCB, and organochlorine pesticides. Freshwater fish consumption advisories will be issued by DPH if warranted.

HUDSON

1) **Water quality:**

Water quality sampling was performed in the Hudson watershed to provide data for 305(b) assessments in both previously assessed and unassessed waters and to identify causes and sources of pathogens and other pollutants to 303(d)-listed (impaired) waters. Water quality surveys were conducted during the weeks of May 6-10, June 10-14, July 15-19, August 12-16 and September 16-20. Samples for TSS and nutrient analyses and bacteria (fecal coliform and E. coli) counts were obtained from eleven (11) sites. Dissolved oxygen and other field parameters were measured at those same locations. Samples for bacteria analysis only were obtained from an additional five (5) sites. In order to meet sample holding times, TSS, nutrient and bacterial analyses were performed through a contractual arrangement with Berkshire Environmental Labs of Lee, MA. Finally, continuous temperature monitoring was performed at two sites in the Specialty Minerals discharge canal and in the Hoosic River upstream and downstream from the canal.

River/Stream	Monitoring Site Description (sample type*)
Hoosic River	Dnstr. from Hoosac WWTP, Williamstown, MA (1,2,3)
Hoosic River	Upstr. from Hoosac WWTP, Wiliamstown, MA (1,2,3)
Hoosic River	Dnstr. from Adams WWTP, Specialty Minerals and Berkshire Mill residences, Hodges Cross Road, North Adams (1,2,3,4)
Hoosic River	Upstr.of the SMI canal and dnstr. from Adams WWTP (4)
Hoosic River	Upstr. from Adams WWTP, Specialty Minerals and Berkshire Mill residences, Lime Street, Adams (1,2,3)
North Br. Hoosic River	Upstr. from Henderson Road, Clarksburg (1,2,3)
North Br. Hoosic River	Near USGS gage off Route 8, North Adams (1,2,3)
Paull Brook	At Galvin Road, North Adams (1,2,3)
Green River	Upstr. from Route 2, Williamstown (1,2,3)
Green River	At Route 7, 2nd bridge up from Five Corners, Williamstown (1,2,3)
Green River	Near Roy's Road, New Ashford (1,2,3)
Hemlock Brook	At Buckley Street, Williamstown (1,2,3)
Kitchen Brook	At West Mountain Road, Cheshire (3)
South Brook	At Main Street, Cheshire (3)
Dry Brook	At Leonard Street, Adams (3)
Peck's Brook	At West Road, Adams (3)
Tophet Brook	At East Street, Adams (3)

*1-Hydrolab, 2-TSS/nutrient, 3-bacteria samples, 4-continuous temperature

2) **TMDL Lakes:**

The north and middle basins of Cheshire Reservoir (Cheshire, MA) were surveyed to provide data in support of the DWM TMDL program. These basins were listed on the 1998 303(d) List of Impaired Waters and are candidates for TMDL development. Working with EPA, a plan was

developed to gather sufficient data from the reservoir to support the TMDL work. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, Secchi disc readings, in situ water quality profile measurements (i.e. temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis at WES, chlorophyll a determinations and the analysis of apparent color. Each basin was sampled on three separate occasions, although Hydrolab profiles were obtained only once.

3) **Biological monitoring:** Biological monitoring in the Hudson watershed entailed macroinvertebrate, periphyton and fish population assessments and fish toxics monitoring. The following is a brief description of these monitoring elements.

A. Macroinvertebrate and Periphyton Community Assessments:

Biomonitoring and habitat assessment to evaluate water quality and habitat quality was performed at a total of fourteen (14) sites. These are listed below. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure utilized Rapid Biomonitoring Protocols (RBP). The periphyton assessment consisted of an approximation of the algal coverage within the reach, and scrapes of various substrates within the riffle zone to obtain samples for taxonomic identification to genus. An estimate was also made of dominance within the sample.

Hudson
Biomonitoring Site Description (sample type*)
South Brook upstr. from Notch Road, Cheshire, MA (1,3)
South Brook near Windsor Road, Cheshire, MA (2)
Dry Brook between Rte. 116 crossings, Adams, MA (1)
Tophet Brook upstr. from East Street, Adams, MA (1,2)
Peck's Brook near DEM bike trail bridge off West Mountain Road, Adams, MA (1,2,3)
Hemlock Brook at Hemlock Brook development, Williamstown, MA (1)
Hemlock Brook near Torrey Woods Road, Wiliamstown, MA (2)
Hoosic River upstr. from Hoosac Water Quality District WWTP, Williamstown, MA (1)
Hoosic River dnstr. from Hoosac Water Quality District WWTP, Williamstown, MA (1,3)
Hoosic River upstr. from Adams WWTP, Adams, MA (1)
Hoosic River dnstr. from Adams WWTP, Adams, MA (1,3)
North Branch Hoosic River upstr. from Henderson Road, Clarksburg, MA (1,2,3)
Green River upstr. from East Branch Green River, New Ashford, MA (1,3)
East Branch Green River upstr. from Roy's Road, New Ashford, MA (1,2)
West Branch Green River upstr. from Old Mill Road, Williamstown, MA (1,2,3)
Green River upstr. from Rte. 43 lower bridge, Williamstown, MA (1,3)
Green River near east Lawn Cemetary, Williamstown, MA (2)

*1-Macroinvertebrate, 2-Fish population, 3-Periphyton id's

B. Fish Population Assessments:

Fish population and habitat assessments were conducted by the DWM at eight (8) sites denoted in the above table to provide a more comprehensive assessment of the aquatic life use status of waterbodies in the Hudson watershed. Methods used to assess fish populations followed a modified version of the USEPA Rapid Bioassessment Protocol V (RBPV). The MDFW performed fish population assessments at an additional 13 locations in the Hudson watershed. These are listed below.

Buxton Brook
Flora Brook
Hoosic River (three sites)
McDonald Brook
Tunnel Brook
Dry Brook
Green River (two sites)
Kinderhook Brook
Mt. Williams Brook
Green River – West Branch

C. Fish Toxics Monitoring:

Fish toxics monitoring was performed on June 18, 2002 at Cheshire Reservoir (Cheshire). Edible fillets were analyzed for the presence of heavy metals, PCB, and organochlorine pesticides. Freshwater fish consumption advisories will be issued by DPH if warranted.

NORTH COASTAL

1) **Water quality:**

Water quality sampling was performed in the North Coastal drainage system to provide data for 305(b) assessment and to document known or suspected water quality problems. Water quality surveys were conducted during the weeks of May 6-10, June 10-14, July 15-19, August 12-16 and September 16-20. Samples for bacteria (fecal coliform, E. coli and Enterococci) analyses were obtained from twenty (20) sites. Dissolved oxygen and other field parameters were measured at those same locations. Samples for nutrient analysis were obtained from thirteen (13) sites.

River/Stream	Monitoring Site Description (sample type*)
Shute Brook	Upstr. from Central Street, Saugus (1,2,3)
Bennetts Pond Brook	Upstr. from Fells Parkway, Saugus (1,2,3)
Alewife Brook	Upstr. from Apple Street, Essex (1,2,3)
Town Line Brook**	Behind Beth Israel Cemetary, Fuller Street, Malden (1,2,3)
Crane River	Upstr. from Ash Street, Danvers (1,2,3)
Frost Fish Brook	Upstr. from Poplar Street, Danvers (1,2,3)
Goldthwaite Brook	Upstr. from Foster Street, Peabody (1,2,3)
Saugus River	Upstr. from Vernon Street, Wakefield (1,2,3)
Saugus River	Dnstr. from Elm Street, Saugus (1,2,3)
Waters River**	Upstr. from Water Street, Danvers (1,2,3)
Forest River**	Upstr. from Loring Avenue, Salem (1,2,3)
Danvers River**	Upstr. from Kernwood Street, Beverly (1,2,3)
Proctor Brook	Upstr. from Goodhue Street, Salem (1,2,3)

Causeway Brook	Dnstr. from Lincoln Street, Manchester (1,3)
Cat Brook	Dnstr. from Lincoln Street (1,3)
Crane Brook	Upstr. from Pine Street, Danvers (1,3)
Beaver Brook	Upstr. from Holten Street, Danvers (1,3)
Essex River**	Upstr. from Main Street, Essex (1,3)
Mill River**	Upstr. from Washington Street, Gloucester (1,3)
Saugus River**	Upstr. from Vitale Park on Ballard Street, Saugus (1,3)

*1-Hydrolab, 2-nutrients, 3-bacteria samples
** Tidal sites

2) **TMDL Lakes:**

Four (4) were surveyed to provide data in support of the DWM TMDL program. These lakes and ponds are listed on the 1998 303(d) List of Impaired Waters and are candidates for TMDL development. Working with EPA, a plan was developed to gather sufficient data from each lake to support the TMDL work. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, secchi disc readings, in situ water quality profile measurements (i.e. temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis at WES, chlorophyll a determinations and the analysis of apparent color. Each of the following lakes was sampled on three separate occasions, although Hydrolab profiles were obtained only once.

NAME	***MUNICIPALITY***
Beck Pond	Hamilton
Coy Pond	Wenham
Pillings Pond	Lynnfield
West Pond	Gloucester

3) **Biological monitoring:** Biological monitoring in the North Coastal drainage system entailed macroinvertebrate assessments and fish toxics monitoring. The following is a brief description of these monitoring elements.

A. Macroinvertebrate Assessments:

Biomonitoring and habitat assessment to evaluate water quality and habitat quality was performed at a total of four (4) sites. These are listed below. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure utilized Rapid Biomonitoring Protocols (RBP).

North Coastal Biomonitoring Site Description
Frost Fish Brook upstr. from Rte. 62, Danvers, MA
Crane River upstr. from Ash Street, Danvers, MA
Alewife Brook upstr. from Babson Reservoir, Gloucester, MA

Saugus River dnstr. from Elm Street, Saugus, MA

B. Fish Toxics Monitoring:

Fish toxics monitoring was performed at four (4) locations. Fish collections were made on April 24-25, 2002 at Reedy Meadow (Wakefield/Lynnfield), on May 22, 2002 at Flax Pond (Lynn), on May 23, 2002 at Silver Lake (Wilmington) and on October 2, 2002 at Foster's Pond (Swampscott). Edible fillets were analyzed for the presence of heavy metals, PCB, and organochlorine pesticides. Freshwater fish consumption advisories will be issued by DPH if warranted.

TEN MILE

1) **Water quality:**

Water quality sampling was performed in the Ten Mile Watershed to provide data for 305(b) assessments and to provide data for TMDL development. Water quality surveys were conducted during the weeks of May 13-17, June 17-21, July 22-26, August 26-30 and September 30-October 1. Dissolved oxygen and other field parameters were measured at a total of seventeen (17) sampling sites. Samples for bacterial analysis (fecal coliform and E.coli) were also obtained from seventeen (17) sites. Samples for standard chemical and nutrient analyses were obtained from 16 stations. During two sampling events additional samples were collected from eight (8) sites to provide data for TMDL development. These analyses included BOD, TKN, dissolved phosphorus and chlorides. Stream flow was measured three times at six (6) sites. Finally, the DWM and EPA sampled the effluent from the Attleboro and North Attleborough POTWs to obtain estimates of point source loadings to the Ten Mile River.

River/Stream	Monitoring Site Description (sample type*)
Ten Mile River	Dnstr. from Fuller Street, Plainville (1,2,3)
Ten Mile River	Dnstr. from West Bacon Street, Plainville (1,2,3)
Ten Mile River	Dnstr. from Landry Street, North Attleborough (3)
Ten Mile River	Upstr. from Route 1, North Attleborough (1,2,3)
Ten Mile River	Upstr. from Cedar Road (above POTW), North Attleborough (1,2,3,4,5)
Ten Mile River	Dnstr. from POTW, North Attleborough (1,2,3,5)
Ten Mile River	Upstr. from Olive Street, Attleboro (1,2,3)
Ten Mile River	Upstr. from Tiffany Street, Attleboro (1,2,3,4,5)
Ten Mile River	Dnstr. from Pond Street, Attleboro (1,2,3,4,5)
Ten Mile River	Upstr. from Central Avenue, Pawtucket, RI (1,2,3,4,5)
Ten Mile River	Upstr. from Pawtucket Avenue at USGS gage, East Providence, RI (5)
Sevenmile River	Upstr. from Draper Avenue, North Attleborough (1,2,3)
Sevenmile River	Upstr. from Pitas Avenue, Attleboro (1,2,3)
Sevenmile River	Upstr. from County Street, Attleboro (1,2,3,4,5)
Fourmile Brook	Dnstr. from West Street, Attleboro (1,2,3)
Speedway Brook	Dnstr. from Route 152, Attleboro (1,2,3)
Coles Brook	Upstr. from Route 152, Seekonk (1,2,3)
Bungay River	Dnstr. from Route 152, Attleboro (1,2,3,4,5)
Bungay River	Upstr. from Holden Street, Attleboro (1)

*1-Hydrolab, 2-chemical/nutrient, 3-bacteria samples, 4-flow, 5-additional analyses for TMDL

2) **TMDL Lakes:**

Six (6) were surveyed to provide data in support of the DWM TMDL program. These lakes and ponds are listed on the 1998 303(d) List of Impaired Waters and are candidates for TMDL development. Working with EPA, a plan was developed to gather sufficient data from each lake to support the TMDL work. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, secchi disc readings, in situ water quality profile measurements (i.e. temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis at WES, chlorophyll a determinations and the analysis of apparent color. Each of the following lakes was sampled on three separate occasions, although Hydrolab profiles were obtained only once.

NAME	***MUNICIPALITY***
Mechanics Pond	Attleboro
Dodgeville Pond	Attleboro
Falls Pond	North Attleborough
Farmers Pond	Attleboro
Central Pond	Seekonk/Pawtucket/Providence
Turner Reservoir	Seekonk/E. Providence

3) **Biological monitoring:** Biological monitoring in the Ten Mile watershed entailed macroinvertebrate, periphyton, and fish population assessments and fish toxics monitoring. The following is a brief description of these monitoring elements.

A. Macroinvertebrate and Periphyton Assessments:

Biomonitoring and habitat assessment to evaluate water quality and habitat quality was performed at a total of eleven (11) sites. These are listed below. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure at nine of the eleven sites followed Rapid Biomonitoring Protocols (RBP). Hester-Dendy multiplate substrates were deployed upstream and downstream from the National Fish Hatchery discharge to the Bungay River. The periphyton assessment consisted of an approximation of the algal coverage within the reach, and scrapes of various substrates within the riffle zone to obtain samples for taxonomic identification to genus. An estimate was also made of dominance within the sample.

Ten Mile Biomonitoring Site Description (sample type*)
Sevenmile River at Draper Avenue, North Attleborough, MA (1,2)
Sevenmile River dnstr. from Pitas Avenue, Attleboro (2)
Ten Mile River at West Bacon Street, Plainville, MA (1,2)
Ten Mile River at Fuller Street, North Attleborough, MA (1,3)
Ten Mile River at Cedar Street, North Attleborough, MA (1,2,3)

Ten Mile River dnstr. from POTW, North Attleborough, MA (1,2,3)
Ten Mile River at Tiffany Street, Attleboro, MA (1,3)
Ten Mile River at Central Street, Pawtucket, RI (1,2,3)
Coles Brook at Talbots Way, Seekonk, MA (1,3)
Fourmile Brook at West Street, Attleboro, MA (1)
Bungay River upstr. from National Fish Hatchery, North Attleborough (1A)
Bungay River dnstr. from National Fish Hatchery, North Attleborough (1A,2)

*1-Macroinvertebrate RBP, 1A-artificial substrates, 2-Fish population, 3-Periphyton id's

B. Fish Population Assessments:

Fish population and habitat assessments were conducted at a total of seven (7) sites to provide a more comprehensive assessment of the aquatic life use status of waterbodies in the Ten Mile River watershed. Sites above and below the North Attleborough POTW were selected to use fish population as an indicator for impacts from this point source. Methods used to assess fish populations followed a modified version of the USEPA Rapid Bioassessment Protocol V (RBPV).

C. Fish Toxics Monitoring:

Fish toxics monitoring was performed at two locations. Fish collections were made on June 25, 2002 at Whiting Pond (North Attleborough) and June 26, 2002 at Mechanics Pond (Attleboro). Edible fillets were analyzed for the presence of heavy metals, PCB, and organochlorine pesticides. Freshwater fish consumption advisories will be issued by DPH if warranted.

ADDITIONAL MONITORING ACTIVITIES – Some monitoring was performed in watersheds that were not actually in "Year 2" of the five-year watershed cycle. This is briefly described below:

Additional Fish toxics monitoring: In addition to the fish collections carried out in the Year 2 watersheds, DWM participated in fish collection efforts in response to public requests through the Inter-agency Fish Toxics Committee at Spy Pond (Arlington), Lower Millpond (Easthampton) and the North River in Pembroke.

Finally, fish samples were collected from Sandra Pond (Westborough) in support of the ongoing USEPA National Study on Chemical Residues in Lake Fish Tissue. Additional lakes are scheduled for sampling next year.